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Building the European Union's Natura 2000 network

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Abstract

In the second half of the 20th Century there was a growing awareness of environmental problems, including the loss of species and habitats, resulting in many national and international initiatives, including the creation of organisations, such as the IUCN, treaties and conventions, such as Ramsar and the Berne Convention, and the establishment of networks of protected areas. Natura 2000 is a network of sites in the European Union for selected species and habitats listed in the 1979 Birds Directive and the 1992 Habitats Directive. Under the Habitats Directive a series of seminars and other meetings have been held with agreed criteria to ensure a coherent network. Despite both scientific and political difficulties the network is now nearing completion.

Keywords

Natura 2000, Birds Directive, Habitats Directive, Biogeographical seminars

Introduction

During the second half of the 20th century there was an increasing awareness of environmental problems with publications such as Silent Spring by Rachel Carson (Carson 1962), Limits to Growth (Meadows et al. 1972) and well publicised international conferences, such as the 1972 United Nations Conference on the Human Environment in Stockholm and the CBD in Rio de Janeiro in 1992. At the same time several international organisations were formed, such as the Wildfowl & Wetlands Trust (1946); IUCN (1948); WWF (1961) and Friends of the Earth (1969). In particular, there was widespread recognition that many species were in danger of extinction with

the IUCN Redlist established in 1963 (Walter and Gillett 1998) and that many habitat types were disappearing. This resulted in a marked increase in the creation of protected areas, such as nature reserves and national parks, in the second half of the 20th century (Dudley 2008). As a result of global concern for the loss of wetlands with a resulting decline in numbers of waterfowl, the Ramsar Convention was signed in 1971, creating the first international network of protected areas. Within Europe the Council of Europe adopted the concept of a European network of Biogenetic reserves to conserve natural or near-natural habitats in 1973, although the programme did not start until 1976. Currently there are 344 Biogenetic reserves in 22 countries but no sites have been added since 1998 (information from EUNIS http://eunis.eea.europa.eu/designations/80:IN01?fromWhere=original).

Following the 2nd European Ministerial Conference on the Environment in 1976 Switzerland published a study recommending a European convention on nature conservation which led to the Berne convention on the Conservation of European Wildlife and Natural Habitats which was opened for signatures in September 1979 (Ribault 2004). The convention included annexes of plant and animal species requiring protection but did not refer to networks of protected areas.

Within the European Union (in this paper EU refers both to the European Union and its predecessors) environmental issues were initially focused on the control of pollution although the 1973 first action plan on the environment identified migratory birds as a possible focus for EU action (EC 1973). After pressure from members of the European parliament following lobbying from the public and Non-governmental organizations (NGOs) for measures by the EU to protect birds, especially migratory species, a proposal for a directive on the conservation of wild birds was published by the European Commission in 1976 (EC 1977) and the Directive on the Conservation of Wild Birds was adopted in 1979 (EC 1979). Before the 1987 Single Act the EU had no formal competence for environmental issues but it was agreed unanimously by the then nine Member States that the conservation of birds was a transfrontier responsibility requiring coordinated action (Jordan 2005). The directive requires the member states to designate sites, known as Special Protection Areas (SPAs), for a list of species considered rare and/or threatened listed in Annex I of the Directive (currently 192 species) together with sites which are important for migratory species.

The EU ratified the Berne Convention in 1982 and, following pressure from NGOs and some Member States (MS), the European Commission published a proposed directive to implement the convention in 1988 (EC 1988). Following the 1987 Single European Act the EU now had a clear legal basis for taking action (Jordan 2005). After heated discussion (e.g. see Sharp 1998) a Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora was adopted on 21 May 1992, more commonly known as the Habitats Directive (EC 1992). This directive includes measures for the strict protection of selected species (listed in Annex IV) and requires the designation of protected sites for selected habitats and species listed in Annexes I & II known initially as Sites of Community Importance (SCIs) and once designated as Special Areas of Conservation (SACs). These sites, together with the SPAs designated under the Birds

Directive, form the Natura 2000 network. With more than 26 000 sites and covering about 17.5% of the EU land territory, Natura 2000 is the largest network of protected areas in the world (Sundseth and Creed 2008).

Although there now exists a substantial literature on the two directives and the Natura 2000 network, little has been published on the development of the network and in particular the series of biogeographical seminars held to examine the Member State proposals for SCIs.

Establishing the network – a brief history

Special Protection Areas are selected and designated by the Member States with no agreed EU criteria for site selection although many countries use criteria based on the Ramsar 1% of flyway population. Once sites have been designated, site details are forwarded to the European Commission using an agreed format, which since the mid 1990s has been in the form of a database. This 'Standard Data Form' (SDF) includes general information on the site (name, latitude & longitude, date designated, etc) together with information on the species present (EC 1997a). The same form is also used for SCIs.

Progress in designating sites was slow at first (Fig. 1) and although there was no agreed process to evaluate site proposals, most Member States have been subject to legal proceedings for non implementation of the directive due to the slow rate of site designation (EC 2006). In many cases the European Commission has used the Birdlife 'Important Bird Areas' (Heath et al. 2000) as a comparison.

The Habitats Directive has criteria for site selection given in Annex III and a system whereby Member States propose potential sites to the European Commission for approval and with a timetable for site proposal and subsequent designation. Although the timetable has not been respected, and many of the EU15 were subject to legal proceedings for failure to propose sites in time (Paavola 2004), it is clear from Figure 1 that progress has been much faster than for the Birds Directive sites.

In response to Article 4 of the directive, the Commission, together with the Member States, and supported by the European Topic Centre on Biological Diversity (ETC/BD) and its predecessors has developed the concept of biogeographical seminars to examine the proposals and to identify gaps in the proposed network. The directive makes reference to biogeographical regions, which are based on maps of natural vegetation but adjusted to fit political and administrative boundaries (ETC/BD 2006). These are used as a framework for assessment with discussions held between all countries within a region, or occasionally for a sub region (e.g. the Pyrenees or the Scandinavian mountains, which are both part of a larger but fragmented Alpine region).

At a meeting held in Funchal, Portugal, in November 1994 to discuss the Macaronesian region the concept of a 'Reference List' was developed and it was agreed that seminars should be held even though the proposals were clearly incomplete using the Macaronesian region as a pilot. The Reference List notes, which Annex I habitat types

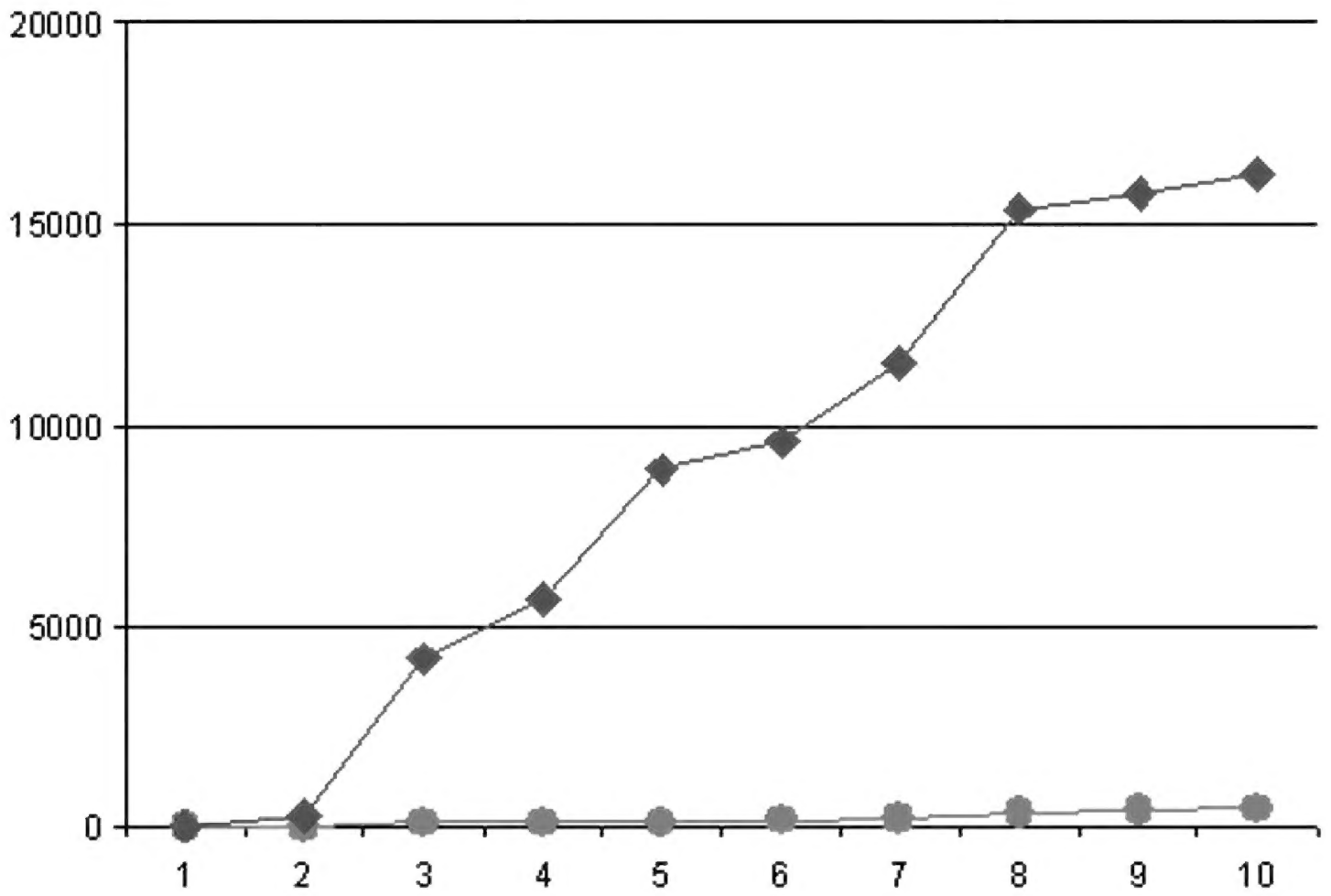

Figure 1. Growth in the number of sites designated in the first ten years of the Birds Directive (1982-1992, red circles) and the Habitats Directive (1994-2004) blue squares). Note that some 10% of SPA and 5% of SCIs have no designation date in the database and that the EU grew from 12 MS in 1992 to 15 MS in 1995 and 25 MS in 2004 (Source ETC/BD).

and Annex II species require sites in a given biogeographical region per country. This is not the same as a classic checklist as a species may be present but only as an occasional visitor such that site designation is not possible.

The 1997 criteria also introduced the so called "20-60% guidelines" but this was clearly to help focus discussion where most useful and was never meant to mean that a given percentage of a population of a species or area of a habitat type must be proposed. However, this has often been misunderstood to mean that at least 60% coverage of the population of a species or area of a habitat was required, especially by NGOs (e.g. WWF 2008).

Further biogeographical seminars were held for Macaronesia in 1996 and 1997 where the methods used later elsewhere (see below) were developed. Meetings held for other regions before 1999 concentrated on agreeing the Reference Lists as very few sites had been proposed by the Member States and, with a few exceptions of mostly endemic species with one or very few known sites, most species and habitat types were not sufficiently represented in the embryo network.

By 1999 most countries had proposed enough sites to allow an analysis of the network species by species and habitat by habitat following the criteria agreed earlier and a series of seminars for the other biogeographical regions started in April 1999 in Vargön,

Sweden, for the Boreal region and the Fennoscandian section of the Alpine region. For the EU15 it was necessary to have two or more seminars per region as it was clear at the first meeting that the proposals were not sufficient for all countries (e.g. for the first Atlantic meeting there were no German sites). However, the first seminars identified the habitats and species that clearly required additional sites and allowed a discussion on the interpretation of some of the Annex I habitats (see Evans 2006, 2010).

The meetings were attended by representatives of the Member States, usually from the Ministries of Environment and/or agencies responsible for nature conservation, the European Commission, the ETC/BD and NGOs. A small number of experts identified by the ETC/BD were also invited, ideally these are independent of both the national authorities and the NGOs. This is not always possible in small countries and some invited experts had given advice to national authorities but had not been involved in the final stages of site selection. At first, only NGOs with an interest in nature conservation were involved, with participation coordinated by the European Habitats Forum (http://www.iucn.org/about/union/secretariat/offices/europe/places/brussels/european_habitats_forum/) but from 2002 onwards NGOs representing land owners and users also participated, coordinated by the European Landowners Organisation (http://www.europeanlandowners.org/). The NGOs have played a major role in implementing Natura 2000 (Weber and Christophersen 2002). Observers were also invited to many seminars, especially from countries negotiating to join the EU who are expected to have their lists of SCIs ready on the day of accession.

The crucial question for the biogeographical seminars was what coverage of a species or habitat type was required in order to meet the obligations of the directive. For very rare species or habitats, for example the Annex II plant *Odontites granatensis,* which is endemic to a small area of the Sierra Nevada in Spain, it is clearly necessary to have all known sites included in the network (although to be sure of long-term survival ex-situ conservation may also be required). But for rare but widespread species and habitats it is not so clear what proportion is required. Following discussions at the Habitats Committee (a committee of Member State representatives established to assist the Commission in implementing the directive) and its Scientific Working Group, the Commission published criteria for the assessment of Member State proposals and for approval of sites as SCIs (EC 1997b). This accepts that a case by case analysis will be necessary but gives the following points to be taken into account during discussion:

- Comparison between the geographical distribution of the sites submitted by the Member States for a given habitat type or species and its known distribution patterns;
- Comparison between the range of habitat or species variation of the whole of the series of proposed SCIs relative to the described ecological and genetic variations of the habitats or species;
- An assessment of the trends of distribution and abundance of the habitats and species related to natural and anthropogenic factors

For each seminar the ETC/BD produced a series of working documents, which included maps of the sites proposed for each habitat or species, summary descriptions of each site and a preliminary analysis for each species or habitat. This preliminary analysis followed the 1997 criteria.

Many sources of information were used for this analysis. For species these included atlases, both national and European, Redbooks and a search of the scientific literature. Much less information was available for habitats, especially at the start of the seminar series. It is clear that it had been intended that the Corine biotopes database (Moss and Wyatt 1994) would be a major source of information but it proved to be of limited use. Many habitats are based on plant communities so the phytosociological literature was very useful, especially for variation in habitat types. However, in many cases it was necessary to use the distribution of key plant species or other features as an indication of probable distribution. For example, distribution maps of *Pinus cembra* and *Larix decidua* give a good indication of the probable distribution of habitat type '9420 Alpine *Larix decidua* and/or *Pinus cembra* forests'. Soil and geological maps also helped. This type of approach was later formalised by the PeenHab project (Mücher et al. 2009).

Many countries published handbooks or other sources of information on the Annex I habitats and Annex II species, such as the French Cahiers d'Habitats series (Bensettiti 2001-2005), although many were published too late to be of use during the seminars. The nature NGOs produced many useful reports, including shadow lists of potential sites (see e.g. Irish Peatland Conservation Council 1999, WWF 2000, WWF Austria & Oikos Inc. 2004). It was particularly difficult to obtain estimates of the area of Annex I habitats present in each Member State and for the populations of some less well known species, such as insects and bryophytes. In such cases discussion was focused on ensuring a good coverage of distribution and variation.

Many habitat types show variation, often linked to environmental factors, such as climate, soil type or altitude. For example '6230 Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas in Continental Europe)' has distinct lowland and upland forms (Galvánek and Janák 2008) and seminars have ensured both forms are represented in the network. Although the species of Annex II have genetic variability this is rarely known in any detail and it has been assumed that a good geographical distribution of sites will capture any such variation. In some cases differences have been described at subspecies level and these can be taken into account, for example the Annex II butterfly *Euphydryas aurinia,* which has several described subspecies and forms (van Helsdingen et al. 1996).

Habitats known to require management, often based on extensive agriculture (Halada et al. 2011), such as hay meadows, have often been the subject of particular attention, especially when there is a known decline in the recent past.

The last seminars for the EU15 were in 2003 for the Mediterranean and Boreal regions by which time all 15 Member States had made substantial proposals (see Fig. 2) but still had gaps for certain habitats and species. Further progress has been assessed through bilateral meetings between the Member States and the European Commission, assisted by the ETC/BD. These meetings are still continuing although

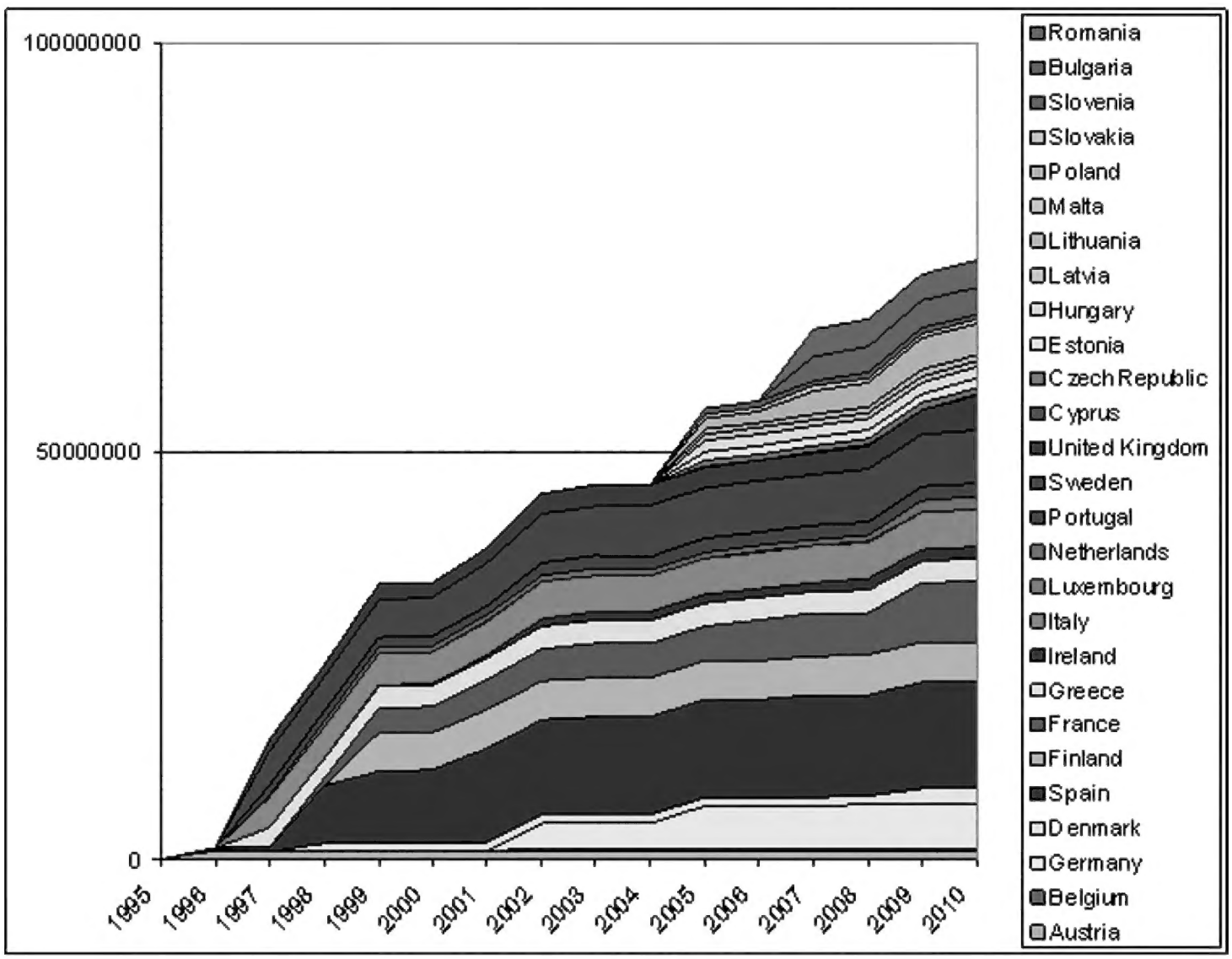

Figure 2. Growth of area (ha) proposed as SCI per MS from 1995 to present (Source ETC/BD).

mostly to discuss changes made to existing sites rather than the proposal of new sites; changes include modifications to site boundaries and the addition or deletion of habitats or species to a given site following re-surveys.

There have been independent assessments of the network but only for some groups of species or habitats and often just in single countries. For example Verovnik et al. (2010) examined the network in Slovenia from the perspective of butterflies while Jantke et al. (2010) examined the effectiveness of Natura 2000 for the conservation of wetland species.

Site Designation

Following discussion species by species and habitat by habitat during the seminars and subsequent bilateral meetings the sites themselves were examined following the 1997 criteria to exclude sites that do not qualify as SCIs and lists of accepted sites are published in the Official Journal of the European Communities for each biogeographical region. The first 'List of SCIs' was adopted in 2001 (Macaronesia) and lists have now been adopted for all regions. Relatively few proposed sites have been rejected, usually as they host no Annex I habitats or Annex II species.

Once sites have been included on a 'Community List' the Member States have six years in which to formally designate the sites as SACs.

EU Enlargement

When the Birds Directive was adopted in 1979, the EU had nine MS but has since grown to 27. At each enlargement the candidate countries have had the opportunity to add habitats and species to the annexes of both directives, and for species of the Habitats Directive to have exemptions (for example several countries have an exemption from Annex IV for *Castor fiber*). Table 1 summarises the changes since the Habitats Directive was adopted. When Austria, Finland and Sweden joined in 1995, only Austria had agreed a full list of amendments and only one habitat type and one species had been proposed by Finland and Sweden for the annexes of the Habitats Directive. A complete list of additional habitats and species for Finland and Sweden was published in 1997 (EC 1997c). Further additions were made in 2004 when 10 countries joined the EU with the latest changes in 2007 when Bulgaria and Romania joined. These amendments followed some four years of negotiations with the ETC/BD giving scientific advice to the European Commission. Further changes will probably be needed for any future EU enlargement.

A second round of seminars started in May 2005 for the EU+10 and as these countries mostly had substantial proposals only one seminar per region has been held. This was due to an agreement that Natura 2000 sites should be identified by the date of accession to avoid damage by EU funded projects, such as transport links. In Poland, the initial proposals were clearly inadequate due to political reasons (see Grodzinska-Jurczak and Cent 2010) and a bilateral meeting including all stakeholders was

Table 1. Changes in the number of habitats and taxa listed in the annexes of the Birds & Habitats Directives due to EU enlargement. The taxa are mostly species but also include subspecies and genera e.g. *Dianthus arenarius* subsp. *bohemicus, Alosa* spp.

	1992	**1995**	**1997**	**2004**	**2007**
a) Birds Directive					
Annex I Birds	175	+7 182	-1 181 †	+13 194 ‡	194
b) Habitats Directive					
Annex I Habitats	169	+9 178	+20 198	+20 218	+13 231
Annex II taxa	633	+6 639	+68 707	+168 875	+22 897

† *Phalacrocorax carbosinensis* was removed from Annex I

‡ *Alectoris graeca* replaced *A. graeca saxatilis* & *A. graeca whitaken* previously listed

held in 2010 following further site proposals. Following the accession of Bulgaria and Romania a seminar was held in 2008 for all four biogeographical regions present. A regularly updated list, with dates, of all seminars and bilateral meetings is available on the ETC/BD website (http://bd.eionet.europa.eu/activities/Natura_2000/pdfs/History_of_the_biogeographical_process_2010.pdf).

Marine Natura 2000

When the first seminars were held it was not clear if the Habitats Directive applied offshore and therefore the marine habitats and species were only assessed in territorial waters (usually 12 nautical miles) during the seminar for the adjacent biogeographical region. Following a court case in England in 1999 and a subsequent judgement by the European Court of Justice in 2005 it was agreed that the two directives apply to all waters where Member States exercise sovereignty or jurisdictional rights. For most Member States this means that the directives apply to their Exclusive Economic Zones, which can extend 200 nautical miles from their coasts (Evans et al. 2011). The Member States asked for guidance on applying the Directives offshore and in March 2003 the Commission established a marine working group, which published guidelines in 2007 (EC 2007). As it was clear that previous assessments needed to be revisited a 'Marine Reserve' was introduced for habitat types and species thought to occur offshore and Member States given more time to identify and propose sites. By 2009 enough SCIs had been proposed to hold a series of marine seminars with a first meeting in Galway, Ireland, in March 2009. As the biogeographical regions are based on terrestrial vegetation they do not form natural regions at sea and so marine regions based on the marine conventions have been used for seminars and also for reporting under Article 17 of the Habitats Directive. Although some countries have proposed significant areas, in general the marine component of the Natura 2000 network is far from complete (Evans et al. 2011).

Site selection

When the Habitats Directive was being negotiated many Member States, especially in NW Europe expected that their existing networks of protected areas would be sufficient for Natura 2000 and these existing sites (nature reserves, national parks etc.) did form the starting point for site selection in most countries. However, as shown by Figure 3, all countries have had to find additional sites for Natura 2000 and this figure understates the additional sites as in some countries designation under national legislation is often involved in site protection. For example, in the United Kingdom most Natura 2000 sites are protected to a large degree due to being also designated as Sites of

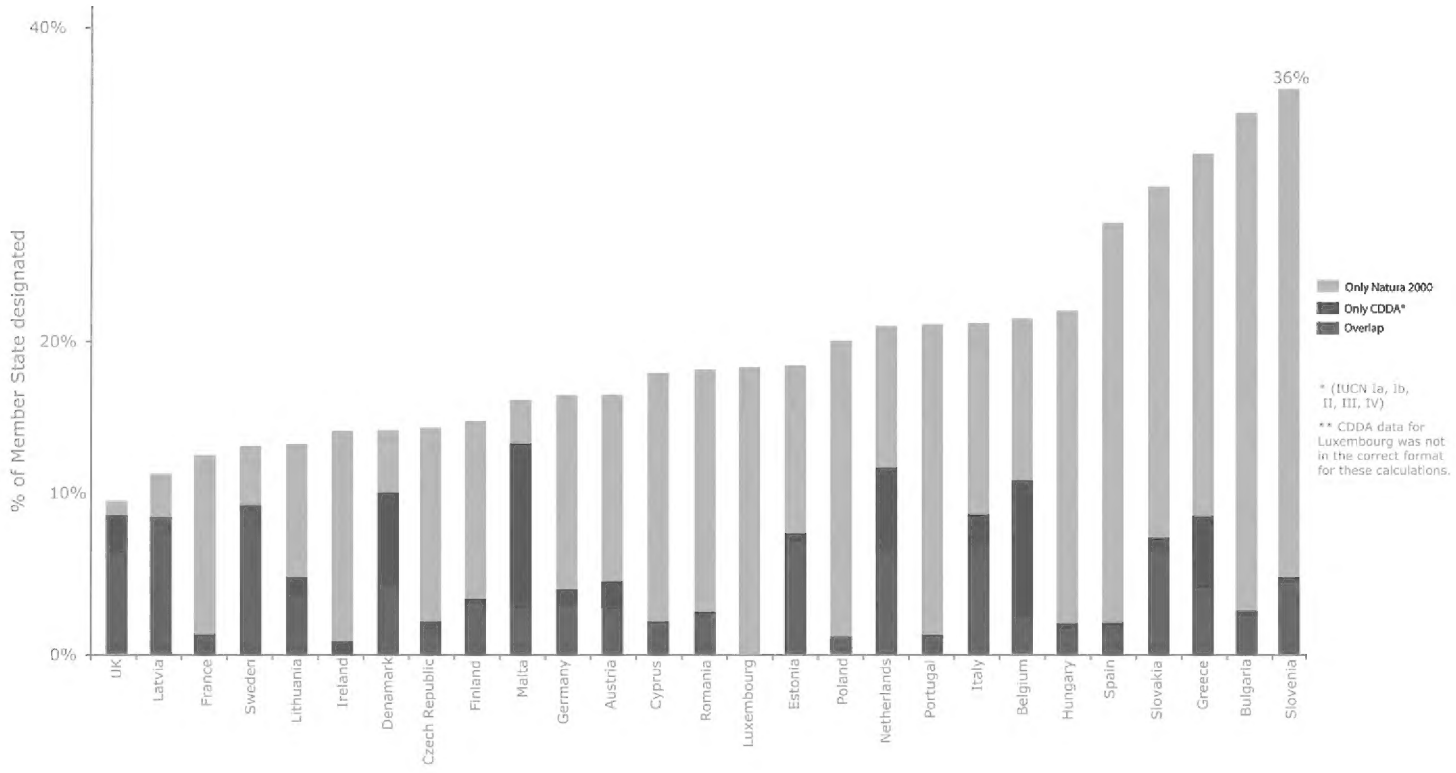

Figure 3. Natura 2000 and protected areas designated under national legislation (IUCN management categories I to IV, Dudley 2008) (Source ETC/BD).
Note. The data from Luxembourg could not be used as it consisted of points, but not the required polygons of the protected area. Only 50% of nationally designated sites in Spain have an IUCN management category reported

Special Scientific Interest (SSSI) and sites identified as being necessary for Natura 2000 are usually also designated as SSSI – of 32 new SSSI in Scotland designated in 1996, 31 were designated in order to be part of Natura 2000 (information from Scottish Natural Heritage sitelink http://gateway.snh.gov.uk/sitelink/index.jsp). In Scotland many of the sites added to the national network were for rivers as these had previously been under represented.

The proportion of each country included into Natura 2000 varies from 7% (United Kingdom) to 36% (Slovenia). Part of this variation is due to ecological differences with relatively few areas of nature conservation interest in urbanised and intensively farmed areas, such as southern England or northern France, but also due to national policies. For example, although the United Kingdom has a low proportion of its territory as SPA or SCI, it does have a well developed system of planning control, which means buffer zones around the key areas of interest are less necessary.

National policy also influences the size of sites, with some countries opting for few, large sites and others for many small sites as shown for Spain and Germany in Figure 4. Large sites may be easier to administer and in some countries management may be directed at a group of sites rather than at individual sites, as in France.

Although software tools such as Marxan (http://www.uq.edu.au/marxan/; Ball et al. 2009) or Zonation (http://www.helsinki.fi/bioscience/consplan/software/Zonation/index.html; Moilanen and Arponen 2011) exist to help design optimal networks of protected areas, it appears that they have not been used for Natura 2000. In many countries funding from the EU LIFE programme helped with site selection, as with the BioItaly project (Blasi 1996).

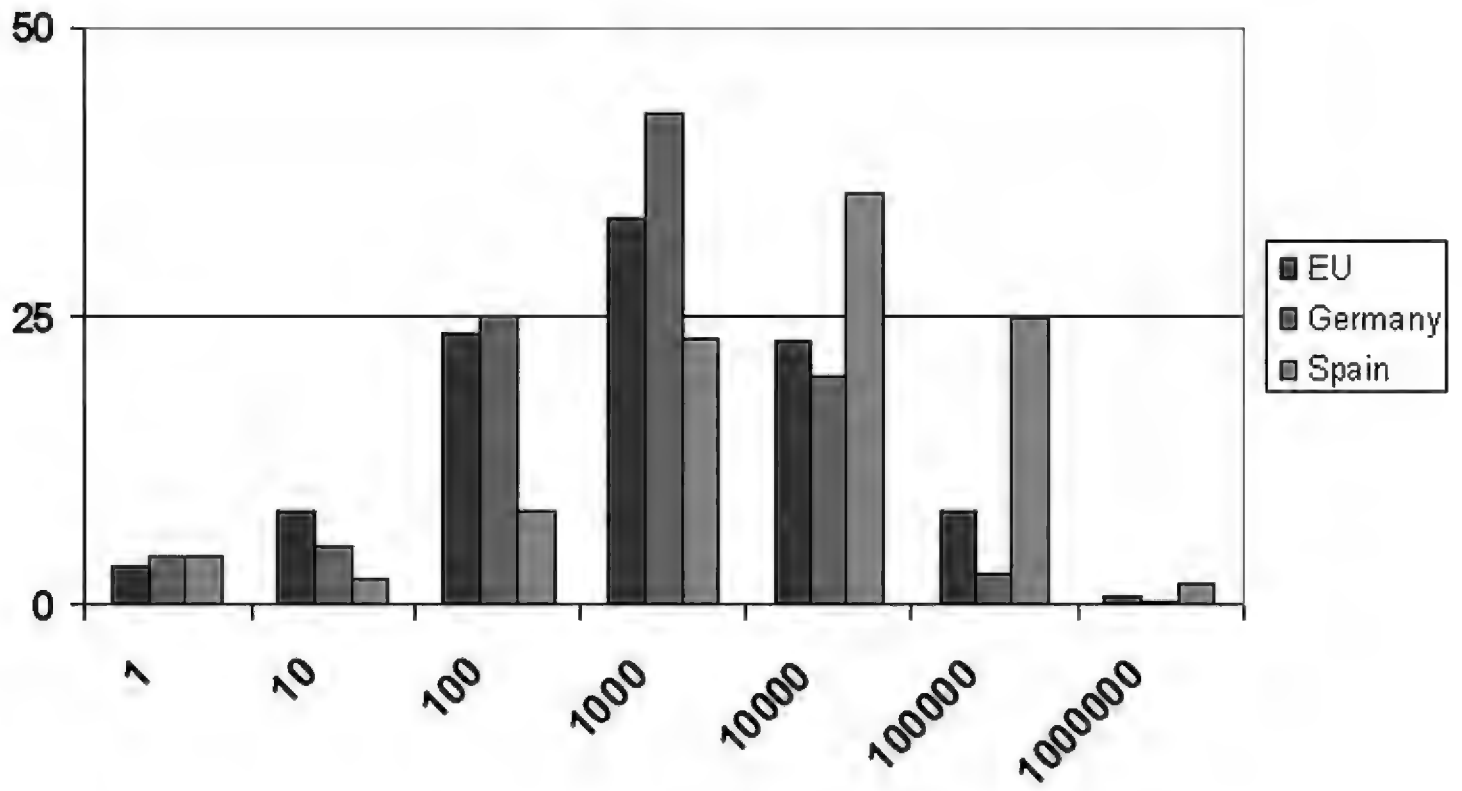

Figure 4. Percentage of sites in each size class (ha) of SCIs in Germany, Spain and the EU, marine sites have been excluded. (Source ETC/BD).

Conclusion

Although there have been considerable difficulties, both scientific and political (Paavola 2004, Keulartz and Leistra 2008), the network is close to complete on land but not at sea and, given the current rate of proposing new marine sites, it seems unlikely that the EU Biodiversity Strategy to 2020 target that "Member States and the Commission will ensure that the phase to establish Natura 2000, including in the marine environment, is largely complete by 2012" (EC 2011a) will be reached. The benefits of the Birds Directive have been demonstrated by Donald et al. (2007) who showed population increases of endangered species in response to conservation measures but to date there is no comparable published study on the Habitats Directive.

The lists of species and habitats has often been criticised and suggestions made for changes (e.g. Evans 2006, Bergmeier et al. 2010) and some countries have had lists of additional interests to help with site selection, such as Italy (Blasi 1996) and Greece (Dafis et al. 1996). However, site designation can help conserve species not listed on the annexes as shown for birds in Latvia (Opermanis et al. 2008) and for gypsophilous plants in Spain (Martínez-Hernández 2011). Indeed the incidental protection of many non listed species was one of the reasons to list habitats rather than just species as for the annexes of the Berne Convention.

Site designation is just a first step in conserving the habitats and species as most require appropriate site management, and there are obligations to protect sites from loss and damage and to monitor the habitats and species listed on the annexes. Although site management plans are not obligatory, they are recommended (EC 2011b) and in some countries, such as France, are required by national law. Two recent publications

concerning Greece and Romania (Apostolopoulou and Pantis 2009, Iojă et al. 2010) suggest that the necessary administration is not in place in some countries.

The Commission, together with the Member States, NGOs and the ETC/BD, is planning a series of seminars, organised by biogeographical regions, to discuss management of Natura 2000 sites. The first meeting will be for the Boreal region and is scheduled for 2012; it is expected to focus on a small number of habitat groups and associated species.

As well as the site network, work towards Natura 2000 has also had other benefits, not least increased scientific study of the habitats and species listed on the annexes including habitat mapping, in some cases of entire countries as in the Czech Republic and Spain (Rivas-Martínez and Peans 2003, Härtel et al. 2009). Future challenges include ensuring the network allows for adaptation to environmental change, including climatic change (Harrison et al. 2006, Vos et al. 2008).

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